Computational Intelligence Techniques For Bioprocess Modelling Supervision And Control Studies In Computational Intelligence

Data Management is the process of planning, coordinating and controlling data resources. More often, applications need to store and search a large amount of data. Managing Data has been continuously challenged by demands from various areas and applications and has evolved in parallel with advances in hardware and computing techniques. This volume focuses on its recent advances and it is composed of five parts and a total of eighteen chapters. The first part of the book contains five contributions in the area of information retrieval and Web intelligence: a novel approach to solving index selection problem, integrated retrieval from Web of documents and data, bipolarity in database querying, deriving data summarization through ontologies, and granular computing for Web intelligence. The second part of the book contains four contributions in knowledge discovery area. Its third part contains three contributions in information integration and data security area. The remaining two parts of the book contain six contributions in the area of intelligent agents and applications of data management in medical domain.

The theme of the 2nd International KES Symposium on Intelligent Interactive Multimedia Systems and Services was integration of multimedia processing techniques in a new wave of user-centric services and processes. This text offers the symposium's proceedings.

A history of of the industrial ecosystem that focuses on the biological sewage treatment plant as an early example. Biological sewage treatment, like electricity, power generation, telephones, and mass transit, has been a key technology and a major part of the urban infrastructure since the late nineteenth century. But sewage treatment plants are not only a ubiquitous component of the modern city, they are also ecosystems--a hybrid variety that incorporates elements of both nature and industry and embodies multiple contradictions. In Hybrid Nature, Daniel Schneider offers an environmental history of the biological sewage treatment plant in the United States and England, viewing it as an early and influential example of an industrial ecosystem. The sewage treatment plant relies on microorganisms and other plants and animals but differs from a natural ecosystem in the extent of human intervention in its creation and management. Schneider explores the relationship between society and nature in the industrial ecosystem and the contradictions that define it: the naturalization of industry versus the industrialization of nature; the public interest versus private (patented) technology; engineers versus bacterial and human labor; and purification versus profits in the marketing of sewage fertilizer. Schneider also describes biotechnology's direct connections to the history of sewage treatment, and how genetic engineering is extending the reaches of the industrial ecosystem to such "natural" ecosystems as oceans, rivers, and forests. In a conclusion that shows how industrial ecosystems continue to evolve, Schneider discusses John Todd's Living Machine, a natural purification method of sewage treatment, as the embodiment of the contradictions of the industrial ecosystem.

Intelligent computing covers a hybrid palette of methods and techniques - rived from classical arti?cial intelligence, computational intelligence, multi-agent systems a.o. Distributed computing studies systems that contain loosely-coupled components running on networked computers and that c- municateandcoordinatetheiractionsbyexchangeofmessages.Theemergent ?eld of intelligent distributed computing is expected to pose special ch- lenges of adaptation and fruitful combination of results of both areas with a great impact on the development of new generation intelligent distributed information systems. Intelligent Distributed Computing – IDC Symposium Series was started as an initiative of research groups from: (i) Systems Research Institute, P- ish Academy of Sciences in Warsaw, Poland and (ii) Software Engineering Department of the University of Craiova, Craiova, Romania. IDC aims at bringing together researchers and practitioners involved in all aspects of - telligent distributed computing. IDC 2009 was the third event in this series and was hosted by Department of Computer Science, University of Cyprus in Ayia Napa, Cyprus during October 13-14, 2009.

This book consists of various contributions in conjunction with the keywords "reasoning" and "intelligent systems", which widely covers theoretical to practical aspects of intelligent systems. Therefore, it is suitable for researchers or graduate students who want to study intelligent systems generally.

This book contains thirty timely contributions in the emerging field of Computational Intelligence (CI) with reference to system control design and applications. The three basic constituents ofCI are neural networks (NNs). fuzzy logic (FL) I fuzzy reasoning (FR). and genetic algorithms (GAs). NNs mimic the distributed functioning of the human brain and consist of many. rather simple. building elements (called artificial neurons) which are controlled by adaptive parameters and are able to incorporate via learning the knowledge provided by the environment, and thus respond intelligently to new stimuli. Fuzzy logic (FL) provides the means to build systems that can reason linguistically under uncertainty like the human experts (common sense reasoning). Both NNs and FL I FR are among the most widely used tools for modeling unknown systems with nonlinear behavior. FL suits better when there is some kind of knowledge about the system. such as, for example, the linguistic information of a human expert. On the other hand. NNs possess unique learning and generalization capabilities that allow the user to construct very accurate models of nonlinear systems simply using input-output data. GAs offer an interesting set of generic tools for systematic random search optimization following the mechanisms of natural genetics. In hybrid Computational Intelligence - based systems these three tools (NNs, FL, GAs) are combined in several synergetic ways producing integrated tools with enhanced learning, generalization. universal approximation. reasoning and optimization abilities.

Cognition-driven decision support system (DSS) has been recognized as a paradigm in the research and development of business intelligence (BI). Cognitive decision support aims to help managers in their decision making from human cognitive aspects, such as thinking, sensing, understanding and predicting, and fully reuse their experience. Among

these cognitive aspects, decision makers' situation awareness (SA) and mental models are considered to be two important prerequisites for decision making, particularly in ill-structured and dynamic decision situations with uncertainties, time pressure and high personal stake. In today's business domain, decision making is becoming increasingly complex. To make a successful decision, managers' SA about their business environments becomes a critical factor. This book presents theoretical models as well practical techniques of cognitiondriven DSS. It first introduces some important concepts of cognition orientation in decision making process and some techniques in related research areas including DSS, data warehouse and BI, offering readers a preliminary for moving forward in this book. It then proposes a cognition-driven decision process (CDDP) model which incorporates SA and experience (mental models) as its central components. The goal of the CDDP model is to facilitate cognitive decision support to managers on the basis of BI systems. It also presents relevant techniques developed to support the implementation of the CDDP model in a BI environment. Key issues addressed of a typical business decision cycle in the CDDP model include: natural language interface for a manager's SA input, extraction of SA semantics, construction of data warehouse queries based on the manger's SA and experience, situation information retrieval from data warehouse, how the manager perceives situation information and update SA, how the manager's SA leads to a final decision. Finally, a cognition-driven DSS, FACETS, and two illustrative applications of this system are discussed.

Differential evolution is arguably one of the hottest topics in today's computational intelligence research. This book seeks to present a comprehensive study of the state of the art in this technology and also directions for future research. The fourteen chapters of this book have been written by leading experts in the area. The first seven chapters focus on algorithm design, while the last seven describe real-world applications. Chapter 1 introduces the basic differential evolution (DE) algorithm and presents a broad overview of the field. Chapter 2 presents a new, rotationally invariant DE algorithm. The role of self-adaptive control parameters in DE is investigated in Chapter 3. Chapters 4 and 5 address constrained optimization; the former develops suitable stopping conditions for the DE run, and the latter presents an improved DE algorithm for problems with very small feasible regions. A novel DE algorithm, based on the concept of "opposite" points, is the topic of Chapter 6. Chapter 7 provides a survey of multi-objective differential evolution algorithms. A review of the major application areas of differential evolution is presented in Chapter 8. Chapter 9 discusses the application of differential evolution in two important areas of applied electromagnetics. Chapters 10 and 11 focus on applications of hybrid DE algorithms to problems in power system optimization. Chapter 12 applies the DE algorithm to computer chess. The use of DE to solve a problem in bioprocess engineering is discussed in Chapter 13. Chapter 14 describes the application of hybrid differential evolution to a problem in control engineering.

This welcome new edition covers bioprocess engineering principles for the reader with a limited engineering background. It explains process analysis from an engineering point of view, using worked examples and problems that relate to biological systems. Application of engineering concepts is illustrated in areas of modern biotechnology such as recombinant protein production, bioremediation, biofuels, drug development, and tissue engineering, as well as microbial fermentation. The main sub-disciplines within the engineering curriculum are all covered; Material and Energy Balances, Transport Processes, Reactions and Reactor Engineering. With new and expanded material, Doran's textbook remains the book of choice for students seeking to move into bioprocess engineering. NEW TO THIS EDITION: All chapters thoroughly revised for current developments, with over 200 pgs of new material, including significant new content in: Metabolic Engineering Sustainable Bioprocessing Membrane Filtration Turbulence and Impeller Design Downstream Processing Oxygen Transfer Systems Over 150 new problems and worked examples More than 100 new illustrations New to this edition: All chapters thoroughly revised for current developments, with over 200 pgs of new material, including significant new content in: Metabolic Engineering Sustainable Bioprocessing Membrane Filtration Turbulence and Impeller Design Downstream Processing Oxygen Transfer Systems Over 150 new problems and worked examples More than 100 new illustrations

Computational Intelligence (CI) and Bioprocess are well-established research areas which have much to offer each other. Under the perspective of the CI area, Biop- cess can be considered a vast application area with a growing number of complex and challenging tasks to be dealt with, whose solutions can contribute to boosting the development of new intelligent techniques as well as to help the refinement and s- cialization of many of the already existing techniques. Under the perspective of the Bioprocess area, CI can be considered a useful repertoire of theories, methods and techniques that can contribute and offer interesting alternative approaches for solving many of its problems, particularly those hard to solve using conventional techniques. Although throughout the past years CI and Bioprocess areas have accumulated substantial specific knowledge and progress has been quick and with a high degree of success, we believe there is still a long way to go in order to use the potentialities of the available CI techniques and knowledge at their full extent, as tools for supporting problem solving in bioprocesses. One of the reasons is the fact that both areas have progressed steadily and have been continuously accumulating and refining specific knowledge; another reason is the high level of technical expertise demanded by each of them. The acquisition of technical skills, experience and good insights in either of the two areas is very demanding and a hard task to be accomplished by any professional. Bioreaction engineering is fundamental to the optimization of biotechnological processes and the production of biochemicals by enzymes, microbial, plant and animal cells and higher organisms. A reference text for postgraduate students and researchers in biochemical engineering and bioreactor design, Multiphase Bioreactor Design describes the The contributed volume aims to explicate and address the difficulties and challenges for the seamless integration of two core disciplines of computer science, i.e., computational intelligence and data mining. Data Mining aims at the automatic discovery of underlying non-trivial knowledge from datasets by applying intelligent analysis techniques. The interest in this research area has experienced a considerable growth in the last years due to two key factors: (a) knowledge hidden

in organizations' databases can be exploited to improve strategic and managerial decision-making; (b) the large volume of data managed by organizations makes it impossible to carry out a manual analysis. The book addresses different methods and techniques of integration for enhancing the overall goal of data mining. The book helps to disseminate the knowledge about some innovative, active research directions in the field of data mining, machine and computational intelligence, along with some current issues and applications of related topics.

Closes the gap between bioscience and mathematics-based process engineering This book presents the most commonly employed approaches in the control of bioprocesses. It discusses the role that control theory plays in understanding the mechanisms of cellular and metabolic processes, and presents key results in various fields such as dynamic modeling, dynamic properties of bioprocess models, software sensors designed for the online estimation of parameters and state variables, and control and supervision of bioprocesses Control in Bioengineering and Bioprocessing: Modeling, Estimation and the Use of Sensors is divided into three sections. Part I, Mathematical preliminaries and overview of the control and monitoring of bioprocess, provides a general overview of the control and monitoring of bioprocesses, and introduces the mathematical framework necessary for the analysis and characterization of bioprocess dynamics. Part II, Observability and control concepts, presents the observability concepts which form the basis of design online estimation algorithms (software sensor) for bioprocesses, and reviews controllability of these concepts, including automatic feedback control systems. Part III, Software sensors and observer-based control schemes for bioprocesses, features six application cases including dynamic behavior of 3-dimensional continuous bioreactors; observability analysis applied to 2D and 3D bioreactors with inhibitory and non-inhibitory models; and regulation of a continuously stirred bioreactor via modeling error compensation. Applicable across all areas of bioprocess engineering, including food and beverages, biofuels and renewable energy, pharmaceuticals and nutraceuticals, fermentation systems, product separation technologies, wastewater and solid-waste treatment technology, and bioremediation Provides a clear explanation of the mass-balance–based mathematical modelling of bioprocesses and the main tools for its dynamic analysis Offers industry-based applications on: myco-diesel for implementing "quality" of observability; developing a virtual sensor based on the Just-In-Time Model to monitor biological control systems; and virtual sensor design for state estimation in a photocatalytic bioreactor for hydrogen production Control in Bioengineering and Bioprocessing is intended as a foundational text for graduate level students in bioengineering, as well as a reference text for researchers, engineers, and other practitioners interested in the field of estimation and control of bioprocesses.

Information security and copyright protection are more important today than before. Digital watermarking is one of the widely used techniques used in the world in the area of information security. This book introduces a number of digital watermarking techniques and is divided into four parts. The first part introduces the importance of watermarking techniques and intelligent technology. The second part includes a number of watermarking techniques. The third part includes the hybrid watermarking techniques and the final part presents conclusions. This book is directed to students, professors, researchers and application engineers who are interested in the area of information security.

This research monograph presents selected areas of applications in the field of control systems engineering using computational intelligence methodologies. A number of applications and case studies are introduced. These methodologies are increasing used in many applications of our daily lives. Approaches include, fuzzy-neural multi model for decentralized identification, model predictive control based on time dependent recurrent neural network development of cognitive systems, developments in the field of Intelligent Multiple Models based Adaptive Switching Control, designing military training simulators using modelling, simulation, and analysis for operational analyses and training, methods for modelling of systems based on the application of Gaussian processes, computational intelligence techniques for process control and image segmentation technique based on modified particle swarm optimized-fuzzy entropy.

Artificial Intelligence is one of the new technologies that has contributed to the successful development and implementation of powerful and friendly control systems. These systems are more attractive to end-users shortening the gap between control theory applications. The IFAC Symposia on Artificial Intelligence in Real Time Control provides the forum to exchange ideas and results among the leading researchers and practitioners in the field. This publication brings together the papers presented at the latest in the series and provides a key evaluation of present and future developments of Artificial Intelligence in Real Time Control system technologies.

Compared with data from general application domains, modern biological data has many unique characteristics. Biological data are often characterized as having large volumes, complex structures, high dimensionality, evolving biological concepts, and insufficient data modelling practices. Over the past several years, bioinformatics has become an all-encompassing term for everything relating to both computer science and biology. The goal of this book is to cover data and applications identifying new issues and directions for future research in biomedical domain. The book will become a useful guide learning state-of-the-art development in biomedical data management, data-intensive bioinformatics systems, and other miscellaneous biological database applications. The book addresses various topics in bioinformatics with varying degrees of balance between biomedical data models and their real-world applications.

For over fifty years now, the famous problem of flow shop and job shop scheduling has been receiving the attention of researchers in operations research, engineering, and computer science. Over the past several years, there has been a spurt of interest in computational intelligence heuristics and metaheuristics for solving this problem. This book seeks to present a study of the state of the art in this field and also directions for future research.

This book explores the increasing convergence of Social Media and Semantic Web technologies. It offers up-to-date contributions that illustrate various approaches to this young and emerging technology area.

The extremely rapid progress of science dealing with the design of new computer systems and the development of intelligent algorithmic solutions for solving c- plex problems has become apparent also in the field of computational intelligence and cognitive informatics methods. The progress of these new branches of inf- matics has only started a few years ago, but they are already making a very s- nificant contribution to the development of modern technologies, and also forming the foundations for future research on building an artificial brain and systems i- tating human thought processes. We are already able to build robots with basic machine intelligence, which can sometimes

perform complex actions and also - erate by adapting to changing conditions of their surroundings. This very impr- sive development of intelligent systems is manifested in the creation of robotic devices which use artificial intelligence algorithms in their operations, mo- ments, when solving difficult problems or communicating with humans. It is also evidenced by the introduction of new methods of reasoning about and interpreting objects or events surrounding the system. One of the fields in which the need to deploy such modern solutions is obvious are cognitive vision systems used both in mobile robots and in computer systems which recognise or interpret the meaning of recorded signals or patterns.

Complex Automated Negotiations have been widely studied and are becoming an important, emerging area in the field of Autonomous Agents and Multi-Agent Systems. In general, automated negotiations can be complex, since there are a lot of factors that characterize such negotiations. These factors include the number of issues, dependency between issues, representation of utility, negotiation protocol, negotiation form (bilateral or multi-party), time constraints, etc. Software agents can support automation or simulation of such complex negotiations on the behalf of their owners, and can provide them with adequate bargaining strategies. In many multi-issue bargaining settings, negotiation becomes more than a zero-sum game, so bargaining agents have an incentive to cooperate in order to achieve efficient win-win agreements. Also, in a complex negotiation, there could be multiple issues that are interdependent. Thus, agent's utility will become more complex than simple utility functions. Further, negotiation forms and protocols could be different between bilateral situations and multi-party situations. To realize such a complex automated negotiati on, we have to incorporate advanced Artificial Intelligence technologies includes search, CSP, graphical utility models, Bays nets, auctions, utility graphs, predicting and learning methods. Applications could include e-commerce tools, decisionmaking support tools, negotiation support tools, collaboration tools, etc. These issues are explored by researchers from different communities in Autonomous Agents and Multi-Agent systems. They are, for instance, being studied in agent negotiation, multi-issue negotiations, auctions, mechanism design, electronic commerce, voting, secure protocols, matchmaking & brokering, argumentation, and co-operation mechanisms. This book is also edited from some aspects of negotiation researches including theoretical mechanism design of trading based on auctions, allocation mechanism based on negotiation among multi-agent, case-study and analysis of automated negotiations, data engineering issues in negotiations, and so on.

This book constitutes the thoroughly refereed post-conference proceedings of the Second International Conference on Agents and Artificial Intelligence, ICAART 2010, held in Valencia, Spain, in January 2010. The 17 revised full papers presented together with an invited paper were carefully reviewed and selected from 364 submissions. Same as the conference the papers are organized in two simultaneous tracks: Artificial Intelligence and Agents. The selected papers reflect the interdisciplinary nature of the conference. The diversity of topics is an important feature of this conference, enabling an overall perception of several important scientific and technological trends.

With the advancement of computers, the use of modeling to reduce time and expense, and improve process optimization, predictive capability, process automation, and control possibilities, is now an integral part of food science and engineering. New technology and ease of use expands the range of techniques that scientists and researchers have at the

Delegates and friends, we are very pleased to extend to you a warm welcome to this, the 12th International Conference on Knowledge-Based and Intelligent Information and Engineering Systems organised by the Faculty of Electrical Engineering and Computing at the University of Zagreb, in association with KES International. For over a decade, KES International has provided an annual wide-spectrum intelligent systems conference for the applied arti?cial intelligence researchc- munity. Having originated in Australia and been held there during 1997–99,the conference visited the UK in 2000,Japan in 2001, Italy in 2002,the UK in 2003, New Zealand in 2004, Australia in 2005, the UK in 2006, Italy in 2007, and now in Zagreb, Croatia in 2008. It is planned that KES 2009 will be held in Santiago, Chile before returning to the UK in 2010. The KES conference is - ture and regularlyattracts severalhundred delegates. As it encompassesa broad range of intelligent systems topics, it provides delegates with an opportunity to mix with researchers from other groups and learn from them. The conference is linked to the InternationalJournalof Intelligent and Knowledge-BasedSystems, published by IOS Press under KES editorship. Extended and enhanced versions of the best papers presented at the KES conference may be published in the Journal. In addition to the annual wide-range intelligent systems conference,KES has run successful symposia in several speci?c areas of the discipline. Agents and Multi-Agent Systems is a popular area of research.

During the last two decades, the idea of Semantic Web has received a great deal of attention. An extensive body of knowledge has emerged to describe technologies that seek to help us create and use aspects of the Semantic Web. Ontology and agent-based technologies are understood to be the two important technologies here. A large number of articles and a number of books exist to describe the use individually of the two technologies and the design of systems that use each of these technologies individually, but little focus has been given on how one can - sign systems that carryout integrated use of the two different technologies. In this book we describe ontology and agent-based systems individually, and highlight advantages of integration of the two different and complementary te- nologies. We also present a methodology that will guide us in the design of the - tegrated ontology-based multi-agent systems and illustrate this methodology on two use cases from the health and software engineering domain. This book is organized as follows: • Chapter I, Current issues and the need for ontologies and agents, describes existing problems associated with uncontrollable information overload and explains how ontologies and agent-based systems can help address these - sues. • Chapter II, Introduction to multi-agent systems, defines agents and their main characteristics and features including mobility, communications and collaboration between different agents. It also presents different types of agents on the basis of classifications done by different authors.

This is the most comprehensive treatise of this topic available, providing invaluable information on the technological and economic benefits to be gained from implementing continuous processes in the biopharmaceutical industry. Top experts from industry and academia cover the latest technical developments in the field, describing the use of single-use technologies alongside perfusion production platforms and downstream operations. Special emphasis is given to process control and monitoring, including such topics as 'quality by design' and automation. The book is supplemented by case studies that highlight the enormous potential of continuous manufacturing for biopharmaceutical production facilities. Written for industrial and academic researchers and development scientists in the life sciences industry, Bioprocessing Technology for Production of Biopharmaceuticals and Bioproducts is a guide to the tools, approaches, and useful developments in bioprocessing. This important guide: • Summarizes state-of-the-art bioprocessing methods and reviews applications in life science industries • Includes illustrative case studies that review six milestone bio-products • Discusses a wide selection of host strain types and disruptive bioprocess technologies

The inspiration from Biology and the Natural Evolution process has become a research area within computer science. For instance, the description of the arti?cial neuron given by McCulloch and Pitts was inspired from biological

observations of neural mechanisms; the power of evolution in nature in the diverse species that make up our world has been related to a particular form of problem solving based on the idea of survival of the ?ttest; similarly, - ti?cial immune systems, ant colony optimisation, automated self-assembling programming, membrane computing, etc. also have their roots in natural phenomena. The ?rst and second editions of the International Workshop on Nature Inspired Cooperative Strategies for Optimization (NICSO), were held in Granada, Spain, 2006, and in Acireale, Italy, 2007, respectively. As in these two previous editions, the aim of NICSO 2008, held in Tenerife, Spain, was to provide a forum were the latest ideas and state of the art research related to nature inspired cooperative strategies for problem solving were discussed. The contributions collected in this book were strictly peer reviewed by at least three members of the international programme committee, to whom we are indebted for their support and assistance. The topics covered by the contributionsincludenature-inspiredtechniqueslikeGeneticAlgorithms,Ant Colonies, Amorphous Computing, Arti?cial Immune Systems, Evolutionary Robotics, Evolvable Systems, Membrane Computing, Quantum Computing, Software Self Assembly, Swarm Intelligence, etc.

This two-volume book on biomass is a reflection of the increase in biomass related research and applications, driven by overall higher interest in sustainable energy and food sources, by increased awareness of potentials and pitfalls of using biomass for energy, by the concerns for food supply and by multitude of potential biomass uses as a source material in organic chemistry, bringing in the concept of bio-refinery. It reflects the trend in broadening of biomass related research and an increased focus on second-generation bio-fuels. Its total of 40 chapters spans over diverse areas of biomass research, grouped into 9 themes.

Information hiding is an area of great interest due to its applications in copyright protection of images, data, passport control, CDs, DVDs, videos and so on. This book presents a sample of recent research results from key researchers. The contributions include: - Copyright protection system; - Video watermarking; - Restoring objects for digital inpainting; - Data embedding scheme; - Robust image watermarking; - Perceptual shaping in digital watermarking; - Image authentication method under JPEG; - Fingerprinting for copyright protection; - Data hiding for halftone images; - Information hiding for digital watermarking. This book is directed to the application engineers, researchers, graduate students, professors and to those who are interested to investigate the information hiding techniques and use them in various applications such as copyright protection of images, data, passport control, CDs, DVDs, videos and so on.

The three volume set LNAI 5177, LNAI 5178, and LNAI 5179, constitutes the refereed proceedings of the 12th International Conference on Knowledge-Based Intelligent Information and Engineering Systems, KES 2008, held in Zagreb, Croatia, in September 2008. The 316 revised papers presented were carefully reviewed and selected. The papers present a wealth of original research results from the field of intelligent information processing in the broadest sense; topics covered in the second volume are artificial intelligence driven engineering design optimization; biomedical informatics: intelligent information management from nanomedicine to public health; communicative intelligence; computational intelligence for image processing and pattern recognition; computational intelligence in human cancer research; computational intelligence techniques for Web personalization; computational intelligent techniques for bioprocess modelling, monitoring and control; intelligent computing for Grid; intelligent security techniques; intelligent utilization of soft computing techniques; reasoning-based intelligent systems: relevant reasoning for discovery and prediction; spatio-temporal database concept support for organizing virtual earth; advanced knowledge-based systems; chance discovery; innovation-oriented knowledge management platform; knowledge-based creativity support systems; knowledge-based interface systems; knowledge-based multi-criteria decision support; and knowledge-based systems for e-business.

This research book contains a sample of most recent research in the area of intelligent autonomous systems. The contributions include: General aspects of intelligent autonomous systems Design of intelligent autonomous robots Biped robots Robot for stair-case navigation Ensemble learning for multi-source information fusion Intelligent autonomous systems in psychiatry Condition monitoring of internal combustion engine Security management of an enterprise network High dimensional neural nets and applications This book is directed to engineers, scientists, professor and the undergraduate/postgraduate students who wish to explore this field further.

Thermophiles and hyperthermophiles exhibit great biotechnological potential, as they can be utilized in processes which require higher temperatures. This book comprehensively deals with all the aspects of thermophiles, starting from the source of these organisms to their latest applications. In addition it presents a compilation of all compounds produced by various thermophilic microorganisms. Due to their application in everyday life, the demands of enzymes that can work at higher temperature have been increasing. In order to keep pace with the increasing demand the industries have to search novel thermophiles producing their product of interest. Hence, this book will be of value for industries working on various biochemical products produced by these thermophiles as well as for scientists and research scholars working on microbiology and products derived from microorganisms.

Computational Intelligence Techniques for Bioprocess Modelling, Supervision and ControlSpringer Science & Business Media

Biological drug and vaccine manufacturing has quickly become one of the highest-value fields of bioprocess engineering, and many bioprocess engineers are now finding job opportunities that have traditionally gone to chemical engineers. Fundamentals of Modern Bioprocessing addresses this growing demand. Written by experts well-established in the field, this book connects the principles and applications of bioprocessing engineering to healthcare product manufacturing and expands on areas of opportunity for qualified bioprocess engineers and students. The book is divided into two sections: the first half centers on the engineering fundamentals of bioprocessing; while the second half serves as a handbook offering advice and practical applications. Focused on the fundamental principles at the core of this discipline, this work

outlines every facet of design, component selection, and regulatory concerns. It discusses the purpose of bioprocessing (to produce products suitable for human use), describes the manufacturing technologies related to bioprocessing, and explores the rapid expansion of bioprocess engineering applications relevant to health care product manufacturing. It also considers the future of bioprocessing—the use of disposable components (which is the fastest growing area in the field of bioprocessing) to replace traditional stainless steel. In addition, this text: Discusses the many types of genetically modified organisms Outlines laboratory techniques Includes the most recent developments Serves as a reference and contains an extensive bibliography Emphasizes biological manufacturing using recombinant processing, which begins with creating a genetically modified organism using recombinant techniques Fundamentals of Modern Bioprocessing outlines both the principles and applications of bioprocessing engineering related to healthcare product manufacturing. It lays out the basic concepts, definitions, methods and applications of bioprocessing. A single volume comprehensive reference developed to meet the needs of students with a bioprocessing background; it can also be used as a source for professionals in the field.

This book is showcases recent advances in knowledge discovery enhanced with semantic and social information. It includes eight chapters that grew out of joint workshops at ECML/PKDD 2007. The contributions emphasize the vision of the Web as a social medium.

Emotional Intelligence is a new discipline of knowledge, dealing with modeling, recognition and control of human emotions. The book Emotional Intelligence: A Cybernetic Approach, to the best of the authors' knowledge is a first compreh- sive text of its kind that provides a clear introduction to the subject in a precise and insightful writing style. It begins with a philosophical introduction to E- tional Intelligence, and gradually explores the mathematical models for emotional dynamics to study the artificial control of emotion using music and videos, and also to determine the interactions between emotion and logic from the points of view of reasoning. The later part of the book covers the chaotic behavior of - existing emotions under certain conditions of emotional dynamics. Finally, the book attempts to cluster emotions using electroencephalogram signals, and d- onstrates the scope of application of emotional intelligence in several engineering systems, such as human-machine interfaces, psychotherapy, user assistance s- tems, and many others. The book includes ten chapters. Chapter 1 provides an introduction to the s- ject from a philosophical and psychological standpoint. It outlines the fundamental causes of emotion arousal, and typical characteristics of the phenomenon of an emotive experience. The relation between emotion and rationality of thoughts is also introduced here. Principles of natural regulation of emotions are discussed in brief, and the biological basis of emotion arousal using an affective neu- scientific model is introduced next.

The overwhelming pace of evolution in technology has made it possible to develop intelligent systems which help users in their dayly life activities. - cordingly, methods of recording, managing and analysing data have evolved from the very simple ?le systems into complex ambient supportive intelligent systems. This book arises as a compilation of methods, techniques and tools c- nected with data related issues: from modelling to analysis. A broad range of approaches such as database self-* techniques for ubiquitous environments, multimedia data, or data driven models will be reviewed. Di?erent areas of applications, in which data models conceptualize nowadays reality, starting from e-learning to electric transformers will be considered. The book is a collection of representative contributions to cover the sp- trum related to data bases, which support decision making and data mining methods as well as conceptualization. Datawarehouse technology and m- eling are presented in the ?rst chapter together with the deep review of datawarehouse techniques for supporting e-learning processes with special emphasis on data cubes, all the tools are considered in the context of imp- mentationofsoftwareapplication.Thesecondchaptercontinueswiththes- ilar technology and deals with the community data warehouse architecture.

Intelligent paradigms are increasingly finding their ways in the design and development of decision support systems. This book presents a sample of recent research results from key researchers. The contributions include: Introduction to intelligent systems in decision making - A new method of ranking intuitionistic fuzzy alternatives - Fuzzy rule base model identification by bacterial memetic algorithms - Discovering associations with uncertainty from large databases - Dempster-Shafer structures, monotonic set measures and decision making - Interpretable decision-making models - A general methodology for managerial decision making - Supporting decision making via verbalization of data analysis results using linguistic data summaries - Computational intelligence in medical decisions making. This book is directed to the researchers, graduate students, professors, decision makers and to those who are interested to investigate intelligent paradigms in decision making.

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